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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Nishita, Naoki
Appl. No. : 10/024,655
Filed : December 14, 2001
For : OPTICAL CONNECTOR
HAVING A LIGHT EMITTING
ELEMENT AND A
CONVERGENT LENS
Examiner : LIN, TINA M.

Group Art Unit 2874

I hereby certify that this correspondence and all marked attachments are being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on

January 16, 2004

(Date)

Mark M. Abumeri, Reg. No. 43,458

APPELLANT'S BRIEF

Board of Patent Appeals and Interferences
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Appellant in the above-captioned patent application is appealing the final rejection of Claims 1-5, all pending claims in this case, in a final Office Action dated July 31, 2003. Pursuant to 37 C.F.R. § 1.191, the examiner's decision in the patent application is therefore in condition for appeal to the Board of Patent Appeals and Interferences.

Pursuant to 37 C.F.R. § 1.192, this appeal brief is filed in triplicate. A check in the amount of \$330 is included herewith for the fee of filing an appeal brief pursuant to 37 C.F.R. § 1.17(c). If for some reason Appellant has not paid sufficient fee for filing this appeal brief, please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

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Appl. No. : 10/024,655
Field : December 14, 2001

I. TABLE OF CONTENTS

I.	TABLE OF CONTENTS	2
II.	TABLE OF AUTHORITIES	3
III.	REAL PARTY IN INTEREST	3
IV.	RELATED APPEALS & INTERFERENCES	3
V.	STATUS OF CLAIMS	3
VI.	STATUS OF AMENDMENTS	4
VII.	SUMMARY OF INVENTION	4
VIII.	ISSUE(S) ON APPEAL.....	5
IX.	GROUPING OF CLAIMS	5
X.	ARGUMENT	6
A.	Combination of Shirakawa and Serizawa Fails to Teach or Suggest a Convergent Lens for Converging Light Emitted from the Light Emitting Element, As Admitted by the Examiner.....	6
B.	There is No Motivation to Combine the Teachings of Shirakawa and Serizawa.....	9
C.	Prior Art of Record Fails to Teach or Suggest all of the Limitations of Dependent Claims 2-5.....	11
XI.	CONCLUSION	12
	APPENDIX A	12

II. TABLE OF AUTHORITIES

Cases

<i>In re Vaeck</i> , 947 F.2d 488 (Fed. Cir. 1991).....	7
<i>In re Wilson</i> , 424 F.2d 1382, 165 U.S.P.Q. 494, 496 (CCPA 1970)	7
<i>In re Fitch</i> , 972 F.2d 1260, 1265, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992).....	8,9
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<i>In re Mills</i> , 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)	10
<i>In re Mills</i> , 916 F.2d 682, 16 USPQ2d 1432 (Fed. Cir. 1990)	10

Statutes

35 U.S.C. § 103(a)	3-6, 11
37 C.F.R. § 1.17(c).....	1
37 C.F.R. § 1.191	1
37 C.F.R. § 1.192	1
M.P.E.P. § 2143.03	7
M.P.E.P. § 2143	8

III. REAL PARTY IN INTEREST

The real party in interest is the Furukawa Electric Co., Ltd, of Tokyo, Japan, which is the assignee of the above-identified patent application.

IV. RELATED APPEALS & INTERFERENCES

None of the Appellant, Appellant's legal representative, or assignee is aware of any appeal or interference which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

V. STATUS OF CLAIMS

The patent application was filed on December 14, 2001, with a total of five claims. In a first Office Action dated April 10, 2003, Claims 1-2 and 4-5 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Patent Application Publication No. US2002/0102073 A1 to Shirakawa (hereinafter "Shirakawa") in view of Patent Application Publication No. US2002/0197023 A1 to Serizawa (hereinafter "Serizawa"). Claim 3 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Shirakawa in view of Serizawa and further in view of U.S. Patent No. 5,923,805 to Anderson, *et al* (hereinafter "Anderson"). In a response filed on

Appl. No. : 10/024,655
Field : December 14, 2001

June 24, 2003, the Appellant submitted remarks in support of its position, and no amendments to the claims were made.

In a final Office Action dated July 31, 2003, the Examiner sustained the same rejection as in the first Office Action, by rejecting Claims 1-2 and 4-5 under 35 U.S.C. § 103(a) as being unpatentable over Shirakawa in view of Serizawa, and rejecting Claim 3 under 35 U.S.C. § 103(a) as being unpatentable over Shirakawa in view of Serizawa and further in view of Anderson. In a response filed on September 17, 2003, the Appellant submitted remarks in support of its position. No amendments to the claims were made. In summary, Claims 1-5 stand rejected.

VI. STATUS OF AMENDMENTS

Appellant did not file any amendment subsequent to the final rejection of the claims.

VII. SUMMARY OF INVENTION

Generally, Appellant's invention is directed to an optical connector that may be mounted and arranged in a vehicle for optical communication within the vehicle. According to at least one embodiment of the invention, optical transmission loss is minimized in a connecting portion of an optical fiber even when the optical fiber is bent in the optical connector.¹

In one embodiment (with reference to Figure 1), the optical connector comprises a receptacle connector (1) and a plug connector (2) fitted to the receptacle connector (1). Connecting end face sides of first and second multimode optical fibers (12, 13) are fixedly arranged side by side in the plug connector (2).² A light emitting element (10), having a radiation numerical aperture larger than the numerical aperture of the multimode optical fiber (12), and a light receiving element (11) are arranged side by side.³ A convergent lens (8) is arranged in the receptacle connector (1). In one embodiment, the convergent lens (8) converges light emitted from the light emitting element (10) so as to provide an incident numerical aperture, for example, (0.25), which is smaller than the numerical aperture ($NA=\beta=0.5$) of the multimode optical fiber (12).

¹ *Spec. at para. 3, page 7.*

² *Id. at paras. 1 and 2, page 8.*

³ *Id. at para. 2, page 9; see also Figs. 2A and 2B.*

In this embodiment, since the convergent lens (8) is arranged on an emitting side of the light emitting element (10) in the receptacle connector (1), the convergent lens (8) causes appropriate refraction of light within the multimode optical fiber (12). This reduces bending loss even when bending of the multimode optical fiber (12) is experienced.⁴ Further, when the multimode optical fiber (12) is connected to another optical fiber, transmission loss is minimized even when positions of the optical fibers are more or less shifted from each other.⁵ This was verified by experimental data.⁶

In the above embodiment, as shown by the characteristic line "a" of Figure 8, the optical transmission loss is very small by arranging the convergent lens (8) in comparison with the results of the characteristic line "b" of Figure 8 in which no convergent lens (8) is arranged.⁷ Further the present inventors measured coupling loss (transmission loss due to connection) when the multimode optical fiber (12) is connected to an optical fiber on a connecting partner side.⁸ As a result, it has been confirmed that the coupling loss can be reduced by using the optical connector of the above embodiment.⁹

VIII. ISSUE(S) ON APPEAL

The issues on appeal are whether:

- (1) Claims 1-2 and 4-5 are unpatentable under 35 U.S.C. § 103(a) over Shirakawa in view of Serizawa; and
- (2) Claim 3 is unpatentable under 35 U.S.C. § 103(a) over Shirakawa in view of Serizawa and further in view of Anderson.

IX. GROUPING OF CLAIMS

In arguing patentability of the claims, where a number of claims contain features which are believed to be common to these claims and patentable over the art, the claims will be

⁴ *Id.* at para. 3, page 13.

⁵ *Id.*

⁶ *Id.*

⁷ *Id.* at para. 2, page 14.

⁸ *Id.* at para. 3, page 14.

⁹ *Id.*

Appl. No. : 10/024,655
Field : December 14, 2001

discussed in groups. It is believed that only the following claims of the group stand or fall together:

Claims 1-5

It is to be understood that the above claims of the group only stand or fall together insofar as this particular appeal before the Board apply. It is believed that there are patentable distinctions among all claims.

X. ARGUMENT

Claims 1-2 and 4-5 are patentable under 35 U.S.C. § 103(a) over Shirakawa in view of Serizawa. Further, Claim 3 is patentable under 35 U.S.C. § 103(a) over Shirakawa in view of Serizawa and further in view of Anderson for the reasons set forth below.

A. Combination of Shirakawa and Serizawa Fails to Teach or Suggest a Convergent Lens for Converging Light Emitted from the Light Emitting Element, As Admitted by the Examiner

1. Examiner's Basis for Showing a Teaching of a "Convergent Lens" as Recited in Claim 1

The Examiner stated that "Shirakawa fails to disclose a convergent lens to converge the light emitted from the light emitting element".¹⁰ The Examiner further stated that "Serizawa does not specifically disclose a convergent lens to create a smaller numerical aperture".¹¹ Without showing a teaching of a convergent lens in the cited references, the Examiner argued that it "would have been obvious to one skilled in the art to have altered the numerical aperture for an improved efficiency".¹²

2. Appellant's Arguments in Opposition to the Basis for Teaching of a Convergent Lens

Appellant respectfully disagrees with the Examiner's rejection of Claim 1, and submits that the Examiner failed to establish a prima facie case of obviousness as required by 35 U.S.C. § 103(a) as discussed below. To establish a prima facie case of obviousness, one of the basic criteria that must be met is that the prior art reference (or references when combined) must teach

¹⁰ *Final O.A. at para. 3, page 2.*

¹¹ *Id. at para. 2, page 4.*

¹² *Id.*

Appl. No. : 10/024,655
Field : December 14, 2001

or suggest all of the claim limitations.¹³ “All words in a claim must be considered in judging the patentability of that claim against the prior art.”¹⁴

Claim 1 recites, among other things, a convergent lens for converging light emitted from the light emitting element so as to provide an incident numerical aperture smaller than the numerical aperture of the multimode optical fiber. Shirakawa neither teaches nor suggests a convergent lens as recited in Claim 1.¹⁵ In addition, Serizawa neither teaches nor suggests a convergent lens recited in Claim 1.¹⁶ The portions cited by the Examiner do not teach or suggest a convergent lens, but relate to a “collimator lens.”¹⁷

The Appellant respectfully submits that the Examiner failed to consider all words in Claim 1 when judging the patentability of the claim against the prior art. More particularly, the Examiner did not provide a basis as to why Serizawa’s disclosure of a “collimator lens” satisfies the “convergent lens” limitation recited in Claim 1. The Appellant already alerted the Examiner of this very distinction between the collimator lens of Serizawa and the convergent lens of Claim 1.¹⁸ The Examiner failed to address this distinction and continued the unfounded assumption that the collimator lens is a convergent lens.¹⁹

In support of its position, Appellant points out that the ordinary and customary meaning of the term collimating or collimator lens generally refers to “a lens on a collimator used to focus light from a source near one of its focal points into a parallel beam.”²⁰ The Appellant submits that such a collimator lens may be characterized at best as a divergent lens, because the collimator lens diverges light from its focal point to parallel beams. In contrast, Claim 1 recites “a convergent lens for converging light.” Because of its inherent property, the collimator lens cannot converge received light. In addition, the collimator lens does not provide a numerical aperture smaller than the numerical aperture of the multimode optical fiber as recited in Claim 1.

¹³ *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991).

¹⁴ *In re Wilson*, 424 F.2d 1382, 165 U.S.P.Q. 494, 496 (CCPA 1970). See also *M.P.E.P.* § 2143.03.

¹⁵ *Final O.A.* at para. 3, page 2.

¹⁶ *Id.* at para. 2, page 4.

¹⁷ *Serizawa* at para. [0095] and [0172].

¹⁸ *Appellant’s Remarks* dated June 24, 2003, page 6.

¹⁹ *Final O.A.* at para. 2, page 4.

²⁰ (emphasis added) (note the meaning of “collimate” is to “render parallel to a certain line or direction”) “*McGraw-Hill Dictionary of Scientific and Technical Terms*”, 3rd Ed., page 326 (1984); a copy of the pertinent page(s) is attached hereto.

As noted in the specification of the present application, the inventor recognized benefits from selecting a converging lens with such claimed characteristics for his invention. For example, when optical communication occurs within a vehicle, a coupling loss is caused in a connecting portion of an optical fiber (12) and bending loss is caused in a bending portion of the optical fiber (12).²¹ When such loss is sufficiently large, little or no light may be transmitted from a light-transmitting element to a light-receiving element.²² The inventor solved this problem by, at least in part, arranging a convergent lens (8) in a receptacle connector (1).²³ The convergent lens (8) is configured to converge light from the light emitting element (10) so as to provide an incident numerical aperture that is smaller than the numerical aperture of the optical fiber (12).²⁴ On the other hand, Serizawa discloses a collimator lens that is incapable of providing the benefits of the convergent lens of Claim 1, because the collimator lens is configured to have a numerical aperture of the sleeve (25) that is larger than that of the optical fiber (40).²⁵ There is no objective teaching in the prior art or knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references.²⁶

3. Summary

In view of the above discussion, neither Shirakawa nor Serizawa teaches or suggests the convergent lens recited in Claim 1. In addition, the combination of the prior art references does not teach or suggest the convergent lens recited in Claim 1, either. Thus, Appellant respectfully submits that the Examiner failed to satisfy his burden of establishing obviousness, because the references, alone or in combination, fail to teach or suggest all of the claim limitations.²⁷

²¹ *Spec. at pp. 4-5.*

²² *Spec. at page 5.*

²³ *Id. at para 3, page 10 (see, e.g., Fig. 1).*

²⁴ *Id.*

²⁵ *Serizawa. at para.[0159].*

²⁶ *In re Fitch*, 972 F.2d 1260, 1265, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992).

²⁷ *M.P.E.P. § 2143.*

B. There is No Motivation to Combine the Teachings of Shirakawa and Serizawa

1. Examiner's Basis for Establishing a Motivation to Combine Teachings of Shirakawa and Serizawa

The Examiner stated that:

"However, the combination of the two references is clear to one skilled in the art. Shirakawa and Serizawa both disclose an optical connector with a receptacle and plug connection. Furthermore, Shirakawa and Serizawa's connectors both include a light emitting and receiving element within the housing for improved efficiency and productivity. Since both Shirakawa and Serizawa disclose receptacle plug type connectors with similar structures, it would have been obvious to combine the two references."²⁸ "Serizawa does disclose numerical aperture of the sleeve to be able to be altered and also the numerical aperture of the sleeve to match the numerical aperture of the fiber. ... It would have been obvious to one skilled in the art to have altered the numerical aperture for an improved efficiency."²⁹

2. Appellant's Arguments in Opposition to the Basis for Motivation to Combine

Appellant respectfully submits that a showing of a suggestion, teaching or motivation to combine the prior art references is an essential component of an obviousness holding.³⁰ Here, the Examiner did not provide a motivation to combine the prior art references but merely indicated that Shirakawa and Serizawa both disclose "similar" subject matter relating to optical connectors and that the combination is "clear" to one of ordinary skill in the art.³¹ Appellant respectfully submits that similarity of subject matter of references does not satisfy a showing of a motivation to combine as required by law.

In addition, the Examiner's assertion that the combination of such teachings is "clear" fails to satisfy the Examiner's burden in sustaining the claim rejections. The Examiner can satisfy the burden of showing obviousness of the combination only by showing some objective teaching in the prior art or knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references.³² Appellant respectfully

²⁸ (emphasis added) *Final O.A. at para. 1, page 4.*

²⁹ *Id. at para. 2, page 4.*

³⁰ *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1124-25, 56 U.S.P.Q.2d 1456, 1459 (Fed. Cir. 2000).

³¹ *Final O.A. at para. 1, page 4.*

³² *In re Fitch*, 972 F.2d 1260, 1265, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992).

Appl. No. : 10/024,655
Field : December 14, 2001

submits that the Examiner failed to present such objective teaching in the prior art or knowledge generally available to one of ordinary skill in the art.

Furthermore, Appellant submits that the mere fact that references can be combine or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.³³ The Examiner argued that Serizawa does disclose numerical aperture of the sleeve to be able to be *altered* and also the numerical aperture of the sleeve to match the numerical aperture of the fiber.³⁴ However, as discussed below, Serizawa does not provide a motivation to obtain a convergent lens for converging light from the light emitting element so as to provide an incident numerical aperture **smaller** than the numerical aperture of the optical fiber.

In *In re Mills*, the court held that the prior art reference which taught that the feed means can be run at a variable speed does not require the output pump be run at the claimed speed.³⁵ Although the prior art device “*may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so.*”³⁶ Similar to *In re Mills*, even if Serizawa teaches that the numerical aperture of the sleeve can be *altered*, Serizawa does not teach or suggest that the numerical aperture can be *altered to be smaller* than the numerical aperture of the optical fiber. Therefore, Serizawa does not provide a motivation to include a convergent lens as recited in Claim 1.

3. Summary

In view of the above discussion, there would have been no motivation in either Shirakawa or Serizawa to combine the teachings of the references and recognize the invention recited in Claim 1.³⁷ Thus, it would not have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of these references to recognize the invention of Claim 1. Appellant respectfully submits that the Examiner failed to satisfy his burden of

³³ (emphasis added) *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).

³⁴ *Final O.A. at para. 2, page 4.*

³⁵ *In re Mills*, 916 F.2d 682, 16 USPQ2d 1432 (Fed. Cir. 1990).

³⁶ *Id.*

³⁷ *Final O.A. at para. 2, page 4. The Examiner admitted that Shirakawa fails to disclose a convergent lens to converge the light emitted from the light emitting element for the purpose of creating a smaller numerical aperture than the optical fiber.*

Appl. No. : 10/024,655
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establishing obviousness because there is no motivation to combine the Shirakawa and Serizawa references to arrive at the claimed invention.

C. Prior Art of Record Fails to Teach or Suggest all of the Limitations of Dependent Claims 2-5

Claims 2 and 4-5 depend from base Claim 1 and further define additional technical features. In view of patentability of their base claim and further additional features, Claims 2 and 4-5 are allowable over the prior art of record.

Claim 3 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Shirakawa in view of Serizawa, and further in view of Anderson. The Examiner does not allege that Anderson teaches the convergent lens as recited in Claim 1. Since Anderson does not cure the above-discussed deficiencies of Shirakawa and Serizawa, the Appellant submits that the combination of all three references fail to teach or suggest all of the limitations of Claim 1. As such, Claim 1 is allowable for at least the reasons discussed above. Since Claim 3 depends on Claim 1, the Appellant submits that Claim 3 is also allowable for at least the same reasons.

XI. CONCLUSION

Appellant submits that the claim limitations discussed above represent only illustrative distinctions from the prior art. There may be other patentable features that distinguish the claimed invention from the prior art. In view of the foregoing, Appellant respectfully submits that all of the pending claims, Claims 1-5 in the present application are in condition for allowance.

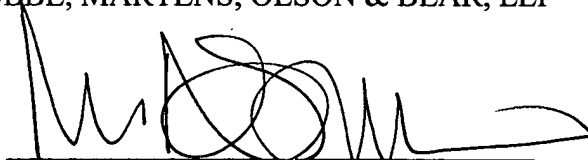
Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated:

January 16, 2004

By:



Mark M. Abumeri
Registration No. 43,458
Attorney of Record
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APPENDIX A

CLAIMS ON APPEAL:

1. An optical connector comprising:
a receptacle connector; and
a plug connector fitted to the receptacle connector;
wherein a connecting end face side of a multimode optical fiber is fixed to the plug connector; and
a light emitting element having a radiation numerical aperture larger than the numerical aperture of said multimode optical fiber, and a convergent lens for converging light emitted from the light emitting element so as to provide an incident numerical aperture smaller than the numerical aperture of said multimode optical fiber and making this light incident to said multimode optical fiber are arranged in said receptacle connector.
2. An optical connector according to claim 1, wherein the light emitting element is set to a light emitting diode (LED).
3. An optical connector according to claim 1, wherein the multimode optical fiber is set to a plastic optical fiber having a diameter not less than 0.5 mm.
4. An optical connector according to claim 1, wherein the connecting end face of the multimode optical fiber is arranged in a position deeper than a connecting end face of the plug connector.
5. An optical connector according to claim 1, wherein a light receiving element arranged side by side with the light emitting element is arranged in the receptacle connector;
a first multimode optical fiber optically connected to said light emitting element, and a second multimode optical fiber optically connected to said light receiving element are arranged side by side in the plug connector; and
an optical connection mediation optical fiber is arranged on a light incident side of said light receiving element in said receptacle connector.



COPY

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(Date)

Mark M. Abumeri, Reg. No. 43,458

APPELLANT'S BRIEF

Board of Patent Appeals and Interferences
United States Patent and Trademark Office
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Dear Sir:

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Appl. No. : 10/024,655
Field : December 14, 2001

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IV.	RELATED APPEALS & INTERFERENCES	3
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M.P.E.P. § 2143.03	7
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III. REAL PARTY IN INTEREST

The real party in interest is the Furukawa Electric Co., Ltd, of Tokyo, Japan, which is the assignee of the above-identified patent application.

IV. RELATED APPEALS & INTERFERENCES

None of the Appellant, Appellant's legal representative, or assignee is aware of any appeal or interference which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

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VI. STATUS OF AMENDMENTS

Appellant did not file any amendment subsequent to the final rejection of the claims.

VII. SUMMARY OF INVENTION

Generally, Appellant's invention is directed to an optical connector that may be mounted and arranged in a vehicle for optical communication within the vehicle. According to at least one embodiment of the invention, optical transmission loss is minimized in a connecting portion of an optical fiber even when the optical fiber is bent in the optical connector.¹

In one embodiment (with reference to Figure 1), the optical connector comprises a receptacle connector (1) and a plug connector (2) fitted to the receptacle connector (1). Connecting end face sides of first and second multimode optical fibers (12, 13) are fixedly arranged side by side in the plug connector (2).² A light emitting element (10), having a radiation numerical aperture larger than the numerical aperture of the multimode optical fiber (12), and a light receiving element (11) are arranged side by side.³ A convergent lens (8) is arranged in the receptacle connector (1). In one embodiment, the convergent lens (8) converges light emitted from the light emitting element (10) so as to provide an incident numerical aperture, for example, (0.25), which is smaller than the numerical aperture ($NA=\beta=0.5$) of the multimode optical fiber (12).

¹ *Spec. at para. 3, page 7.*

² *Id. at paras. 1 and 2, page 8.*

³ *Id. at para. 2, page 9; see also Figs. 2A and 2B.*

In this embodiment, since the convergent lens (8) is arranged on an emitting side of the light emitting element (10) in the receptacle connector (1), the convergent lens (8) causes appropriate refraction of light within the multimode optical fiber (12). This reduces bending loss even when bending of the multimode optical fiber (12) is experienced.⁴ Further, when the multimode optical fiber (12) is connected to another optical fiber, transmission loss is minimized even when positions of the optical fibers are more or less shifted from each other.⁵ This was verified by experimental data.⁶

In the above embodiment, as shown by the characteristic line "a" of Figure 8, the optical transmission loss is very small by arranging the convergent lens (8) in comparison with the results of the characteristic line "b" of Figure 8 in which no convergent lens (8) is arranged.⁷ Further the present inventors measured coupling loss (transmission loss due to connection) when the multimode optical fiber (12) is connected to an optical fiber on a connecting partner side.⁸ As a result, it has been confirmed that the coupling loss can be reduced by using the optical connector of the above embodiment.⁹

VIII. ISSUE(S) ON APPEAL

The issues on appeal are whether:

- (1) Claims 1-2 and 4-5 are unpatentable under 35 U.S.C. § 103(a) over Shirakawa in view of Serizawa; and
- (2) Claim 3 is unpatentable under 35 U.S.C. § 103(a) over Shirakawa in view of Serizawa and further in view of Anderson.

IX. GROUPING OF CLAIMS

In arguing patentability of the claims, where a number of claims contain features which are believed to be common to these claims and patentable over the art, the claims will be

⁴ *Id.* at para. 3, page 13.

⁵ *Id.*

⁶ *Id.*

⁷ *Id.* at para. 2, page 14.

⁸ *Id.* at para. 3, page 14.

⁹ *Id.*

Appl. No. : 10/024,655
Field : December 14, 2001

discussed in groups. It is believed that only the following claims of the group stand or fall together:

Claims 1-5

It is to be understood that the above claims of the group only stand or fall together insofar as this particular appeal before the Board apply. It is believed that there are patentable distinctions among all claims.

X. ARGUMENT

Claims 1-2 and 4-5 are patentable under 35 U.S.C. § 103(a) over Shirakawa in view of Serizawa. Further, Claim 3 is patentable under 35 U.S.C. § 103(a) over Shirakawa in view of Serizawa and further in view of Anderson for the reasons set forth below.

A. Combination of Shirakawa and Serizawa Fails to Teach or Suggest a Convergent Lens for Converging Light Emitted from the Light Emitting Element, As Admitted by the Examiner

1. Examiner's Basis for Showing a Teaching of a "Convergent Lens" as Recited in Claim 1

The Examiner stated that "Shirakawa fails to disclose a convergent lens to converge the light emitted from the light emitting element".¹⁰ The Examiner further stated that "Serizawa does not specifically disclose a convergent lens to create a smaller numerical aperture".¹¹ Without showing a teaching of a convergent lens in the cited references, the Examiner argued that it "would have been obvious to one skilled in the art to have altered the numerical aperture for an improved efficiency".¹²

2. Appellant's Arguments in Opposition to the Basis for Teaching of a Convergent Lens

Appellant respectfully disagrees with the Examiner's rejection of Claim 1, and submits that the Examiner failed to establish a prima facie case of obviousness as required by 35 U.S.C. § 103(a) as discussed below. To establish a prima facie case of obviousness, one of the basic criteria that must be met is that the prior art reference (or references when combined) must teach

¹⁰ *Final O.A. at para. 3, page 2.*

¹¹ *Id. at para. 2, page 4.*

¹² *Id.*

Appl. No. : 10/024,655
Field : December 14, 2001

or suggest all of the claim limitations.¹³ “All words in a claim must be considered in judging the patentability of that claim against the prior art.”¹⁴

Claim 1 recites, among other things, a convergent lens for converging light emitted from the light emitting element so as to provide an incident numerical aperture smaller than the numerical aperture of the multimode optical fiber. Shirakawa neither teaches nor suggests a convergent lens as recited in Claim 1.¹⁵ In addition, Serizawa neither teaches nor suggests a convergent lens recited in Claim 1.¹⁶ The portions cited by the Examiner do not teach or suggest a convergent lens, but relate to a “collimator lens.”¹⁷

The Appellant respectfully submits that the Examiner failed to consider all words in Claim 1 when judging the patentability of the claim against the prior art. More particularly, the Examiner did not provide a basis as to why Serizawa’s disclosure of a “collimator lens” satisfies the “convergent lens” limitation recited in Claim 1. The Appellant already alerted the Examiner of this very distinction between the collimator lens of Serizawa and the convergent lens of Claim 1.¹⁸ The Examiner failed to address this distinction and continued the unfounded assumption that the collimator lens is a convergent lens.¹⁹

In support of its position, Appellant points out that the ordinary and customary meaning of the term collimating or collimator lens generally refers to “a lens on a collimator used to focus light from a source near one of its focal points into a parallel beam.”²⁰ The Appellant submits that such a collimator lens may be characterized at best as a divergent lens, because the collimator lens diverges light from its focal point to parallel beams. In contrast, Claim 1 recites “a convergent lens for converging light.” Because of its inherent property, the collimator lens cannot converge received light. In addition, the collimator lens does not provide a numerical aperture smaller than the numerical aperture of the multimode optical fiber as recited in Claim 1.

¹³ *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991).

¹⁴ *In re Wilson*, 424 F.2d 1382, 165 U.S.P.Q. 494, 496 (CCPA 1970). See also *M.P.E.P.* § 2143.03.

¹⁵ *Final O.A.* at para. 3, page 2.

¹⁶ *Id.* at para. 2, page 4.

¹⁷ *Serizawa* at para. [0095] and [0172].

¹⁸ *Appellant’s Remarks* dated June 24, 2003, page 6.

¹⁹ *Final O.A.* at para. 2, page 4.

²⁰ (*emphasis added*) (note the meaning of “collimate” is to “render parallel to a certain line or direction”) “*McGraw-Hill Dictionary of Scientific and Technical Terms*”, 3rd Ed., page 326 (1984); a copy of the pertinent page(s) is attached hereto.

As noted in the specification of the present application, the inventor recognized benefits from selecting a converging lens with such claimed characteristics for his invention. For example, when optical communication occurs within a vehicle, a coupling loss is caused in a connecting portion of an optical fiber (12) and bending loss is caused in a bending portion of the optical fiber (12).²¹ When such loss is sufficiently large, little or no light may be transmitted from a light-transmitting element to a light-receiving element.²² The inventor solved this problem by, at least in part, arranging a convergent lens (8) in a receptacle connector (1).²³ The convergent lens (8) is configured to converge light from the light emitting element (10) so as to provide an incident numerical aperture that is smaller than the numerical aperture of the optical fiber (12).²⁴ On the other hand, Serizawa discloses a collimator lens that is incapable of providing the benefits of the convergent lens of Claim 1, because the collimator lens is configured to have a numerical aperture of the sleeve (25) that is larger than that of the optical fiber (40).²⁵ There is no objective teaching in the prior art or knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references.²⁶

3. Summary

In view of the above discussion, neither Shirakawa nor Serizawa teaches or suggests the convergent lens recited in Claim 1. In addition, the combination of the prior art references does not teach or suggest the convergent lens recited in Claim 1, either. Thus, Appellant respectfully submits that the Examiner failed to satisfy his burden of establishing obviousness, because the references, alone or in combination, fail to teach or suggest all of the claim limitations.²⁷

²¹ *Spec. at pp. 4-5.*

²² *Spec. at page 5.*

²³ *Id. at para 3, page 10 (see, e.g., Fig. 1).*

²⁴ *Id.*

²⁵ *Serizawa. at para.[0159].*

²⁶ *In re Fitch*, 972 F.2d 1260, 1265, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992).

²⁷ *M.P.E.P. § 2143.*

B. There is No Motivation to Combine the Teachings of Shirakawa and Serizawa

1. Examiner's Basis for Establishing a Motivation to Combine Teachings of Shirakawa and Serizawa

The Examiner stated that:

"However, the combination of the two references is clear to one skilled in the art. Shirakawa and Serizawa both disclose an optical connector with a receptacle and plug connection. Furthermore, Shirakawa and Serizawa's connectors both include a light emitting and receiving element within the housing for improved efficiency and productivity. Since both Shirakawa and Serizawa disclose receptacle plug type connectors with similar structures, it would have been obvious to combine the two references."²⁸ "Serizawa does disclose numerical aperture of the sleeve to be able to be altered and also the numerical aperture of the sleeve to match the numerical aperture of the fiber. ... It would have been obvious to one skilled in the art to have altered the numerical aperture for an improved efficiency."²⁹

2. Appellant's Arguments in Opposition to the Basis for Motivation to Combine

Appellant respectfully submits that a showing of a suggestion, teaching or motivation to combine the prior art references is an essential component of an obviousness holding.³⁰ Here, the Examiner did not provide a motivation to combine the prior art references but merely indicated that Shirakawa and Serizawa both disclose "similar" subject matter relating to optical connectors and that the combination is "clear" to one of ordinary skill in the art.³¹ Appellant respectfully submits that similarity of subject matter of references does not satisfy a showing of a motivation to combine as required by law.

In addition, the Examiner's assertion that the combination of such teachings is "clear" fails to satisfy the Examiner's burden in sustaining the claim rejections. The Examiner can satisfy the burden of showing obviousness of the combination only by showing some objective teaching in the prior art or knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references.³² Appellant respectfully

²⁸ (emphasis added) *Final O.A. at para. 1, page 4.*

²⁹ *Id. at para. 2, page 4.*

³⁰ *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1124-25, 56 U.S.P.Q.2d 1456, 1459 (Fed. Cir. 2000).

³¹ *Final O.A. at para. 1, page 4.*

³² *In re Fitch*, 972 F.2d 1260, 1265, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992).

Appl. No. : 10/024,655
Field : December 14, 2001

submits that the Examiner failed to present such objective teaching in the prior art or knowledge generally available to one of ordinary skill in the art.

Furthermore, Appellant submits that the mere fact that references can be combine or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.³³ The Examiner argued that Serizawa does disclose numerical aperture of the sleeve to be able to be *altered* and also the numerical aperture of the sleeve to match the numerical aperture of the fiber.³⁴ However, as discussed below, Serizawa does not provide a motivation to obtain a convergent lens for converging light from the light emitting element so as to provide an incident numerical aperture smaller than the numerical aperture of the optical fiber.

In *In re Mills*, the court held that the prior art reference which taught that the feed means can be run at a variable speed does not require the output pump be run at the claimed speed.³⁵ Although the prior art device “*may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so.*”³⁶ Similar to *In re Mills*, even if Serizawa teaches that the numerical aperture of the sleeve can be *altered*, Serizawa does not teach or suggest that the numerical aperture can be *altered to be smaller* than the numerical aperture of the optical fiber. Therefore, Serizawa does not provide a motivation to include a convergent lens as recited in Claim 1.

3. Summary

In view of the above discussion, there would have been no motivation in either Shirakawa or Serizawa to combine the teachings of the references and recognize the invention recited in Claim 1.³⁷ Thus, it would not have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of these references to recognize the invention of Claim 1. Appellant respectfully submits that the Examiner failed to satisfy his burden of

³³ (emphasis added) *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).

³⁴ *Final O.A. at para. 2, page 4.*

³⁵ *In re Mills*, 916 F.2d 682, 16 USPQ2d 1432 (Fed. Cir. 1990).

³⁶ *Id.*

³⁷ *Final O.A. at para. 2, page 4. The Examiner admitted that Shirakawa fails to disclose a convergent lens to converge the light emitted from the light emitting element for the purpose of creating a smaller numerical aperture than the optical fiber.*

Appl. No. : 10/024,655
Field : December 14, 2001

establishing obviousness because there is no motivation to combine the Shirakawa and Serizawa references to arrive at the claimed invention.

C. Prior Art of Record Fails to Teach or Suggest all of the Limitations of Dependent Claims 2-5

Claims 2 and 4-5 depend from base Claim 1 and further define additional technical features. In view of patentability of their base claim and further additional features, Claims 2 and 4-5 are allowable over the prior art of record.

Claim 3 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Shirakawa in view of Serizawa, and further in view of Anderson. The Examiner does not allege that Anderson teaches the convergent lens as recited in Claim 1. Since Anderson does not cure the above-discussed deficiencies of Shirakawa and Serizawa, the Appellant submits that the combination of all three references fail to teach or suggest all of the limitations of Claim 1. As such, Claim 1 is allowable for at least the reasons discussed above. Since Claim 3 depends on Claim 1, the Appellant submits that Claim 3 is also allowable for at least the same reasons.

XI. CONCLUSION

Appellant submits that the claim limitations discussed above represent only illustrative distinctions from the prior art. There may be other patentable features that distinguish the claimed invention from the prior art. In view of the foregoing, Appellant respectfully submits that all of the pending claims, Claims 1-5 in the present application are in condition for allowance.

Respectfully submitted,

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APPENDIX A

CLAIMS ON APPEAL:

1. An optical connector comprising:
a receptacle connector; and
a plug connector fitted to the receptacle connector;
wherein a connecting end face side of a multimode optical fiber is fixed to the plug connector; and
a light emitting element having a radiation numerical aperture larger than the numerical aperture of said multimode optical fiber, and a convergent lens for converging light emitted from the light emitting element so as to provide an incident numerical aperture smaller than the numerical aperture of said multimode optical fiber and making this light incident to said multimode optical fiber are arranged in said receptacle connector.
2. An optical connector according to claim 1, wherein the light emitting element is set to a light emitting diode (LED).
3. An optical connector according to claim 1, wherein the multimode optical fiber is set to a plastic optical fiber having a diameter not less than 0.5 mm.
4. An optical connector according to claim 1, wherein the connecting end face of the multimode optical fiber is arranged in a position deeper than a connecting end face of the plug connector.
5. An optical connector according to claim 1, wherein a light receiving element arranged side by side with the light emitting element is arranged in the receptacle connector;
a first multimode optical fiber optically connected to said light emitting element, and a second multimode optical fiber optically connected to said light receiving element are arranged side by side in the plug connector; and
an optical connection mediation optical fiber is arranged on a light incident side of said light receiving element in said receptacle connector.